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Pathways over the Life Course: Patterns of Depressive Symptoms in Adolescence and Their Potential Impact on Educational Attainment

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PATHWAYS OVER THE LIFE COURSE: PATTERNS OF DEPRESSIVE SYMPTOMS IN ADOLESCENCE AND THEIR POTENTIAL IMPACT ON EDUCATIONAL ATTAINMENT

by

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ABSTRACT

This analysis draws on life course sociology to investigate the association between depression in adolescence and postsecondary completion in young adulthood. Three gaps in the mental health and education literature are addressed: lack of attention to the duration and timing of depressive symptoms, the overuse of high school degree receipt and college entry as outcome variables, and the exclusion of theoretically important confounders, such as self-rated health. Using panel data from the National Longitudinal Study of Adolescent to Adult Health, distinct mental health pathways that are based on a 12-item revision of the Center for Epidemiologic Studies Depression Scale are identified. Bivariate and multivariate logistic regression analyses are used to test nested models that predict educational attainment as a function of depression. Depressed adolescents are significantly less likely to complete postsecondary schooling relative to those who never experience depression, net of participant and parental characteristics. The association is especially strong for youth who experience an early onset of depressive symptoms and who are chronically depressed. The findings suggest that poor mental health in adolescence is a potential mechanism in the intergenerational transmission of socioeconomic status, which warrants further discussion on intervention strategies and increased availability of resources that are supportive of the psychological well-being of elementary and high school students.

Keywords: life course, mental health, depression, educational attainment, adolescence

Introduction

It has been well-established that adults with higher levels of education are in better psychological health and are significantly less likely to report depressive symptoms (Gibson, Baker & Milner, 2015; Lee, 2011; Lynch, 2003; McFarland & Wagner, 2014; Ross & Mirowsky, 1989, 1996, 2006, 2011). The literature in this substantive area has largely focused on adulthood, examining how educational attainment relates to depression from midlife to older ages (Johnson et al., 2015). However, comparatively few studies have considered the experiences of adolescents to investigate if the causal process is more complex; more specifically, if depression early in the life course is related to subsequent educational attainment in young adulthood (Haas & Fosse, 2008; Johnson et al., 2015; McLeod & Fettes, 2007). These studies have made momentous contributions by examining selection processes, demonstrating that the relationship between education and health is best conceptualized as a reciprocal process over the life course and that mental health in adolescence is a potential mechanism in the intergenerational transmission of socioeconomic status (Jackson, 2009; Johnson et al., 2015; McLeod & Fettes, 2007).

The existing literature has demonstrated that physical and psychological conditions in adolescence, including depression, are linked to poor educational attainment in young adulthood net of sociodemographic, psychosocial, and family background characteristics. These findings clearly illustrate the utility of considering distal processes over the life course when studying inequality (Haas, 2006; Haas & Fosse, 2008; Jackson, 2009; McLeod & Kaiser, 2004; McLeod, Uemura & Rohrman, 2012; Palloni, 2006; Pavalko & Caputo, 2013). However, many of these studies have not adequately considered if different patterns of depressive symptoms in adolescence are related to educational attainment. The life course concepts of duration and

timing offer potential avenues for investigation. In this context, duration refers to the length of time that is spent in a depressed state (Settersten, 2003). Moreover, the concept of timing refers to the age when depression is first experienced (Settersten, 2003). It is likely that individuals who are consistently depressed throughout their adolescent years will have different educational outcomes compared to those who experience depressive symptoms periodically or for a short period of time. Likewise, if we compare adolescents who experience an early or late onset of depressive symptoms, it is possible that they will have different levels of academic achievement. Scholars who have utilized the concept of duration to empirically investigate other health-related research questions have generally found that the length of time spent in disadvantaged circumstances is important for understanding negative outcomes (Corna, 2013; Pavalko & Caputo, 2013; Pienta, Hayward & Jenkins, 2000; Shuey & Willson, 2014; Williams & Umberson, 2004). The timing of major life transitions has also been linked to psychological well-being and socioeconomic status (Barban, 2013; Dupre & Meadows, 2007; McLeod & Fettes, 2007).

Based on previous scholarship that has utilized the concept of duration, I surmise that adolescents who are consistently depressed for long periods of time will have lower levels of educational attainment as adults when compared to those who have had shorter bouts of depression. However, the potential effects of early and late onset of depressive symptoms on educational attainment are not as easy to anticipate, since the theories of developmental continuity and discontinuity offer contradictory predictions that require further testing (McLeod & Fettes, 2007; McLeod & Pavalko, 2008). These discrepancies and theoretical orientations should be carefully assessed to obtain a more nuanced understanding on how early life course experiences shape later socioeconomic outcomes in adulthood.

Using data from waves one, two, and four of the National Longitudinal Study of Adolescent to Adult Health in the United States, the current study attempts to fill gaps in the literature by answering the following four questions. First, does depression in adolescence predict lower educational attainment in young adulthood? Second, are different patterns and durations of depressive symptoms in adolescence associated with distinct educational outcomes? More specifically, are adolescents who are consistently depressed less likely to complete postsecondary education in young adulthood when compared to those who experience depression periodically or for shorter periods of time? Third, is the timing of depression in adolescence related to educational attainment? If so, is an early or late onset of depressive symptoms more detrimental? Lastly, do these relationships remain significant, net of participant and parental characteristics?

Background

The Intergenerational Transmission of Inequality: Causation and Selection Processes

Sociologists and stress researchers who investigate the associations between socially structured experience and psychological well-being have largely examined causation processes in adulthood (Johnson et al., 2015; McLeod & Pavalko, 2008). In other words, they have explored why and how social statuses and circumstances influence mental health outcomes (Eaton & Muntaner, 1999; McLeod & Pavalko, 2008). In addition, a growing body of literature has also investigated how sociodemographic and family background characteristics moderate the relationship between educational attainment and mental health outcomes (Bauldry, 2014; Brand & Xie, 2010; Shafer, Wilkinson & Ferraro, 2013; Schann, 2013). That is to say, the health-related benefits of education vary immensely across population subgroups. Causation perspectives are buttressed by fundamental cause theory, which suggests that the relationship

between socioeconomic status and well-being is persistent because privileged individuals have greater access to a wide array of resources that are protective of health (Phelan, Link & Tehranifar, 2010). More specifically, education is believed to be a fundamental cause of health because it appears to help individuals avoid physical ailments and psychological distress through a multitude of mechanisms (Johnson et al., 2015). For instance, those who are highly educated tend to have superior earnings, flexible and safer job conditions, greater knowledge and cognitive skills, higher levels of social support, and are more likely to adopt healthy lifestyles when compared to those who are less educated (Johnson et al., 2015). Perhaps most importantly, the link between education and health is enduring and exists in different countries, suggesting that the intervening protective and risk factors that account for this association are not static and evolve over time (Johnson et al., 2015; Link, Phelan, Miech & Westin, 2008). Therefore, an important conclusion that can be drawn from fundamental cause theory is that education-related resources are flexible and allow individuals to avoid risk and adopt strategies that are protective of health, regardless of what the intervening mechanisms are in a particular time and context (Johnson et al., 2015; Link et al., 2008; Phelan et al., 2010).

Relatively few studies have investigated selection processes whereby mental health in childhood and adolescence subsequently affects socioeconomic status in young adulthood (Haas & Fosse, 2008; Johnson et al., 2015; McLeod & Pavalko, 2008). The greater emphasis on causation processes can be partially attributed to the strong desire of researchers to document the negative impact of social disadvantage on individuals (McLeod & Pavalko, 2008). Furthermore, the success of fundamental cause theory, as outlined above, may have further motivated researchers to adopt this approach (Bryant, Raphael, Schrecker & Labonte, 2011; Hatzenbuehler, Phelan & Link, 2013; Phelan et al., 2010). There are several other reasons why sociologists have

not adequately considered selection processes. First, some mental health researchers assert that selection mechanisms may fall outside the purview of sociological analysis, often associating these effects with genetic causation (Eaton & Muntaner, 1999; McLeod & Fettes, 2007; McLeod & Pavalko, 2008). For instance, it has been speculated that large variations in the prevalence of certain mental disorders across ethnic groups might be partially attributed to genetics (Eaton & Muntaner, 1999). Second, some researchers shy away from examining selection mechanisms because they are concerned that it may be interpreted as blaming the individual (McLeod & Pavalko, 2008). An unintended consequence of this approach, some argue, is that empathy for individuals in disadvantaged circumstances could be diminished by attributing their status to their physical or psychological maladies (McLeod & Pavalko, 2008). These various perspectives have led many researchers to view selection processes as methodological nuisances (Johnson et al., 2015). Although the greater emphasis that has been placed on causation processes is somewhat understandable, it has lead to several gaps in our knowledge and is highly problematic from a life course perspective.

The life course perspective deepens our understanding of social causation and selection processes, encouraging us not to view them as competing hypotheses. The opposition between these two hypotheses is challenged by the premise that individual development is lifelong (George, 2003; McLeod & Pavalko, 2008; Pavalko & Willson, 2011; Settersten, 2003). Life course scholars are more concerned with uncovering the long-term processes that lead to outcomes of interest than they are with vindicating causation effects, which has largely characterized the mental health literature (George, 2003). McLeod and Pavalko (2008) add further to this perspective, suggesting that whenever we examine a particular life stage, we only get a small constituent of a longer and more nuanced life. By extension, we are in a better

position to understand a particular life stage of an individual if we use his or her past experiences as reference points (McLeod & Pavalko, 2008). With respect to life stages, it is also the case that the evidence for causation or selection effects may be stronger or weaker, depending on our point of entry in the study of the life course (Johnson et al., 2015; McLeod & Pavalko, 2008). For example, if we are investigating the association between education and mental health among older adults, it is probable that causation effects will be more pertinent (Johnson et al., 2015; McLeod & Pavalko, 2008). In contrast, if we are trying to document connections between adolescent and adult life stages within the same substantive area, selection processes may play a more significant role (Johnson et al., 2015; McLeod & Pavalko, 2008). When we consider the life course in its entirety, it is clear that structural conditions and mental health ultimately share a reciprocal relationship and operate in mutually reinforcing ways (George, 2003; Pavalko & Caputo, 2013). Johnson et al. (2015) provide a cogent overview of the mutually reinforcing relationship that is shared between mental health and education over the life course:

> It is not simply the case that educational attainment affects health via a range of mechanisms that scholars can map, but that (a) parents' education levels and health affect childhood and adolescent health which affects educational attainment, (b) parents' education levels and health affect children's eventual education via childhood health but also parenting behaviour and other mechanisms, and that (c) educational attainment has further important implications for health, and both attainment and health in turn presumably shape these outcomes for future children. (p. 377)

Due to data limitations and methodological challenges, this entire process cannot be fully considered in a single study (Bauldry, Shanahan, Boardman, Miech & Macmillan, 2012; Johnson et al., 2015). However, Johnson et al. (2015) posit that this overall pattern can be extrapolated by

piecing together studies that look at different life stages. Three important implications can be drawn from the commentary above. First, selection processes are clearly within the purview of sociology, and previous researchers were misguided in viewing them almost exclusively as methodological nuisances. Because of this previous approach, the aspects of this reciprocal process that pertain to the early life course have been largely understudied. Second, mental health in adolescence plays a pivotal role in the intergenerational transmission of inequality because it can diminish educational attainment and later occupational status. In turn, the progeny of these distressed individuals may be born into disadvantaged socioeconomic circumstances that will likely influence their psychological well-being, thus repeating the cycle. Lastly, when the relationship between adolescent mental health and subsequent educational attainment is analyzed, it is vital to account for background characteristics, including parental educational attainment and household structure, because these are antecedent factors (Guo, 1998; Haas, 2006; Johnson et al., 2015). In the next section, the existing literature that has examined this particular life stage will be thoroughly reviewed.

Adolescent Mental Health and Educational Attainment

Although the relationship between childhood and adolescent mental health and subsequent educational attainment has been relatively understudied, especially when compared to the literature that examines causation processes in adulthood, there have been fairly consistent and robust findings. For instance, several of these studies, as alluded to above, suggest that family background and parental education are confounding variables that are linked to mental health early in the life course as well as to later educational attainment (Avison, 2010; Guo, 1998; Haas, 2006; Haas & Fosse, 2008; Jackson, 2009; Pearlin, Schieman, Fazio & Meersman, 2005). Other confounding variables include urban or rural residence, whether one was raised in a

one- or two-parent household, and the number of siblings (Pearlin et al., 2005). To be more specific, those who were raised in rural areas, lived in a one-parent household, and grew up with many siblings tend to have worse status attainment on average (Pearlin et al., 2005). Those who are raised in less privileged circumstances disproportionately experience trajectories characterized by perpetual disadvantage, both in terms of mental health and education (Pearlin et al., 2015). However, net of family background, parental education, and sociodemographic characteristics, poor mental health in childhood and adolescence still has adverse effects on subsequent educational attainment and wealth accumulation later in the life course, and these findings have been replicated in different countries and cohorts (Haas, 2006; Haas & Fosse, 2008; Jackson, 2009; McLeod & Fettes, 2007; McLeod & Kaiser, 2004; McLeod et al., 2012; Palloni, 2006). Furthermore, Haas and Fosse (2008) observe that cognitive abilities, early academic success, and other psychosocial factors appear to explain a great deal of the relationship between adolescent mental health and subsequent academic achievement. Nevertheless, even when accounting for these confounding variables, adolescents in poor mental health are still less likely to complete high school by their twentieth birthday and are less likely to enroll in and complete postsecondary education (Haas & Fosse, 2008). McLeod and Kaiser (2004) have concluded that children's and adolescents' academic success is not fully determined by their family background and intellectual endowments, but also by their emotional dispositions and behavioural responses to stressors.

Scholars have utilized multiple research approaches to further investigate the relationship between adolescent mental health and subsequent educational attainment. Some researchers have investigated how different combinations of mental health issues affect educational attainment, as opposed to examining depression's effects in isolation. For instance, McLeod et al. (2012) find

that individuals who experience multiple emotional and behavioural problems simultaneously, including depression, attention problems, delinquency, and substance use, have lower grade point averages and are less likely to obtain advanced degrees when compared to those who experience only one of these conditions. In addition, the effects of depression on educational attainment are substantially attenuated when including attention problems, delinquency, and substance use into the regression (McLeod et al., 2012).

Some researchers have incorporated various life course concepts in their analyses, including heterogeneity, to see how this relationship varies across different population subgroups. The concept of heterogeneity suggests that human populations are diverse and that outcomes of interest to researchers vary according to gender, socioeconomic status, race, and ethnicity (Elder & George, 2016; George, 1993). Jackson (2009) adopts this research angle and investigates whether the link between adolescent health and educational attainment varies across ethnic groups. She finds that the reduction in attainment is particularly strong for non-Hispanic whites, which suggests that the adverse educational ramifications of poor health are still relevant to socially advantaged groups (Jackson, 2009). Other scholars have utilized the concept of heterogeneity by investigating sex differences. For example, McLeod and Kaiser (2004) determined that "the effect of internalizing problems on high school degree receipt was stronger for boys than for girls" (p. 648). This result is consistent with other evidence that non-stereotypical "behaviour elicits [harsher] social responses" (McLeod & Kaiser, 2004, p. 648; Rosenfield, 1982). However, the strength of the association is relatively weak and marginally significant, and so McLeod and Kaiser (2004) are hesitant to conclude that there are meaningful sex differences. Interestingly, Read and Gorman (2010) posit that the psychological well-being of girls tends to be more heavily influenced by poor family background when compared to boys,

which adds a new layer of complexity. Depression and family background play critical roles in the intergenerational transmission of inequality, as mentioned above, but boys and girls are impacted by each of these factors differently (Johnson et al., 2015; McLeod & Kaiser, 2004; Read & Gorman, 2010; Rosenfield, 1982).

Although the body of literature that explores connections between adolescent mental health and subsequent educational attainment has been growing at an appreciable pace and has uncovered a great deal of nuance, few studies have considered how the patterning of depressive symptoms may be related to academic achievement. As alluded to above, duration and timing are relevant conceptual and methodological tools. The lack of attention paid toward duration in this research domain is especially surprising because enduring stressors and prolonged exposure to negative circumstances have been found to have more deleterious effects on both socioeconomic and mental health outcomes when compared to periodic or transient problems (Corna, 2013; Pavalko & Caputo, 2013; Pearlin et al., 2005; McLeod & Fettes, 2007; Pienta et al., 2000; Shuey & Willson, 2014; Thoits, 2010; Williams & Umberson, 2004). Moreover, according to stress research, continuous and repeated stressors are more likely to have a cumulative effect on allostatic load (Pearlin et al., 2005; Thoits, 2010). Allostatic load refers to the burden that is placed on an individual and his or her biological functions in response to various demands and hardships (Pearlin et al., 2005). Adolescents who have mental health problems, including depression, experience numerous constraints and have to contend with negative evaluations and educational expectations from parents, teachers, and peers, which have been demonstrated to partially explain their poor educational outcomes (McLeod & Fettes, 2007). Moreover, the symptoms of depression are believed to detract from academic performance (Hinshaw & Hinshaw, 1992; McLeod & Kaiser, 2004; McLeod et al., 2012; Roeser, Eccles & Strobel, 1998).

It is fairly intuitive, therefore, that adolescents who experience depressive symptoms for longer durations will experience worse educational outcomes because they will have greater exposure to these constraints and negative evaluations.

The timing of depressive symptoms and their concomitant effects on educational attainment are difficult to anticipate because the theories of developmental continuity and discontinuity offer contradictory explanations. It is important to determine which of these theories are better supported because different policies and intervention strategies are needed to obviate or manage mental health problems that develop in early or late adolescence (McLeod & Fettes, 2007). According to the developmental theory of continuity, early life experiences are formative and are especially critical for later life outcomes (McLeod & Fettes, 2007; McLeod & Pavalko, 2008). According to this perspective, "early life experiences create enduring dispositions that are important in their own right but that are also reinforced in social interaction so as to set into motion processes of cumulative advantage and disadvantage" (McLeod & Pavalko, 2007, p. 84). Therefore, individuals who experience an early onset of depressive symptoms will have worse educational attainment than those who experience them later in adolescence (McLeod & Fettes, 2007; McLeod & Pavalko, 2008).

Conversely, the theory of developmental discontinuity points to "the potential for change in individual characteristics or in their underlying function or meaning of life transitions" (McLeod & Fettes, 2007, p. 658). By emphasizing the potential for change, it is implied that temporally proximate experiences are the most crucial determinants for socioeconomic and mental health outcomes (McLeod & Fettes, 2007; McLeod & Pavalko, 2008). By extension, adolescents who experience a later onset of depressive symptoms will have worse educational outcomes compared to those who experience them earlier in the life course (McLeod & Fettes,

2007; McLeod & Pavalko, 2008). A foundational proposition of this perspective is that negative events that are experienced earlier in the life course become less important as adolescents mature and accumulate more life experience, facilitating personal growth and change (McLeod & Fettes, 2007; McLeod & Pavalko, 2008).

As stated above, duration and timing have not been routinely incorporated into research on mental health and educational attainment among adolescents. In addition, the theories of developmental continuity and discontinuity require further testing. However, McLeod and Fettes (2007) have offered an excellent starting point. Using data from the Children of the National Longitudinal Surveys of Youth, the authors identify latent classes that characterize trajectories of internalizing problems, such as depression, from childhood through adolescence to estimate high school completion and college entry (McLeod & Fettes, 2007). They find that the timing of internalizing problems is irrelevant when estimating high school completion (McLeod & Fettes, 2007). Generally speaking, stably high levels of internalizing problems in earlier and later developmental stages are associated with worse educational attainment, which does not support the theories of developmental continuity or discontinuity (McLeod & Fettes, 2007). However, youth who consistently experience internalizing issues at younger ages are significantly less likely to enroll in college, whereas youth who experience similar issues in late adolescence are no less likely to enter college (McLeod & Fettes, 2007). The findings that pertain to internalizing problems and their effects on college entry lend more credence to the theory of developmental continuity (McLeod & Fettes, 2007).

Contributions of Present Analysis and Hypotheses

The present analysis advances the literature in several important ways. First, to my knowledge, no other study has explicitly considered both duration and timing when investigating

the relationship between depression in adolescence and subsequent educational attainment with the National Longitudinal Study of Adolescent to Adult Health. Second, while the study by McLeod and Fettes (2007) utilized high school completion and college enrollment as dependent variables, the present study investigates if depression is related to the completion of postsecondary education. This research angle is of utmost importance because some studies suggest that the benefits associated with educational attainment are most fully realized after the completion of university degrees (Johnson et al., 2015; Liu et al., 2011; Rosenbaum, 2012). Therefore, the completion of postsecondary education may be a more relevant outcome variable than either high school diploma receipt or college entry. Lastly, the present analysis will include a wide range of potential confounders and mediators that have been identified in the literature, including academic aptitude, self-rated health, and parental education. Based on the existing literature, I advance the following hypotheses:

1) Adolescents who are depressed will be less likely to complete postsecondary schooling compared to those who are not depressed.

2) Adolescents who experience severe depressive symptoms will be less likely to complete postsecondary schooling compared to those who experience only somewhat elevated symptoms.

3) Adolescents who are consistently depressed will be less likely to complete postsecondary education in young adulthood compared to those who experience depression periodically or for shorter periods of time.

4) Early onset of depression will be a more important predictor of educational achievement than late onset. McLeod and Fettes (2007) found that early onset of internalizing issues is a stronger

predictor of college entry than late onset; perhaps similar patterns will be observed when the completion of postsecondary schooling is used as an outcome variable.

5) The relationship between depression and academic achievement will be statistically significant, net of sociodemographic attributes, self-rated health, academic aptitude, and family background characteristics.

Data and Methods

Data Set

The current study utilizes data from waves one, two, and four of the National Longitudinal Study of Adolescent to Adult Health (Add Health). Add Health is a longitudinal study of the health and well-being of American adolescents that follows a nationally representative sample of youth from the middle and high school years through the transition to early adulthood. A stratified sample of 80 high schools and 52 middle schools was selected into the study, and 90,118 students in grades 7 to 12 who attended these schools in 1994 participated in an in-school survey. Among those who completed the in-school survey, a subsample of 20,745 students was randomly selected to participate in an in-home interview, which provided data for the wave one instrument. All respondents who completed the wave one interview were asked to participate in the wave two interview a year later, with the exception of high school seniors. 14,738 completed interviews comprise the data for the wave two instrument. The in-school interviews and first two waves of data capture changes in physical and mental health among participants over their adolescent years. The third wave of Add Health is not relevant to the present analysis because it specifically focuses on the transition from adolescence to adulthood and does not contain as many survey items that denote depressive symptoms compared to waves

one and two. For these reasons, wave three has been excluded. In 2008, 15,701 of the original wave one respondents were interviewed again to create the wave four instrument. The final instrument captures the participants' health and socioeconomic standing in young adulthood.

This data set is well-suited to the research questions at hand for the following reasons. First, participants in waves one and two reported detailed information on a wide range of mental health-related questions, which have been used to construct predictor variables based on the Center for Epidemiologic Studies Depression Scale (CES-D Scale) (Poulin, Hand & Boudreau, 2005; Radloff, 1977; Rushton, Forcier & Schectman, 2002). Second, because of the longitudinal design, variables that capture the duration and timing of depressive symptoms can be constructed to address the third and fourth hypotheses. Third, wave one survey data includes several potential confounders and mediators that have been identified in the literature, including the academic aptitude of participants, self-rated health, and parental educational achievement. Fourth, Add Health also provides information on the sociodemographic characteristics of respondents, including race, gender, and age. Lastly, participants in wave four, ranging from 24 to 32 years of age, reported their highest level of educational attainment, allowing us to assess how their mental health in adolescence is related to their current educational attainment, net of all other controls.

Analytic Sample

The present analysis utilizes the public-use version of Add Health, which consists of a random one-third of the full sample. The sample sizes of waves one, two, and four in the public-use version of Add Health are 6,504, 4,834, and 5,114, respectively. Following the recommendations of McLeod et al. (2012), only participants in the wave one survey who are also included in waves two and four and who have valid sampling weights are included in the final analytic sample (N = 3,924).

It should be noted that the participants who are unmatched across the waves do not differ substantially from those who are matched. For example, according to t-tests and chi-square statistics, respondents who are unmatched between waves one and two do not differ from those who are matched on a wide range of sociodemographic and psychological characteristics, including sex, self-rated health, and standardized vocabulary test scores; most importantly, these groups do not differ significantly with respect to the main predictor, namely depression. However, significant differences are observed between both groups in terms of race and age. Greater proportions of those who are unmatched are Hispanic, African American, Native American, and Asian. Moreover, unmatched participants are older by approximately one year. This age-related discrepancy can be partially attributed to the sampling design of Add Health; as mentioned above, high school seniors did not participate in the wave two survey.

These groups also appear to come from dissimilar family backgrounds, as t-tests and chi-square statistics reveal significant differences with respect to parental age, parental education, household income, marital status, and parental self-rated health. Interestingly, there are far greater proportions of missing data in the parental instrument among those who did not participate in the wave two survey. In fact, when examining the parental variables listed above, nearly twice as many cases are missing among those who are unmatched. Similar patterns are observed among those who are matched and unmatched between waves one and four. Even though these racial, age-related, and parental discrepancies could limit generalizability, no major differences are observed with respect to the focal variables and valid observations in all of the waves is important for research linking mental health history to subsequent educational attainment. It is critical to the research design that all participants in the analytic sample are matched across waves one, two, and four.

Measures

Educational Attainment.

The wave four instrument includes a variable that indicates the participants' level of educational attainment. Respondents were asked the following question: "[w]hat is the highest level of education that you have achieved to date?" Response categories range from less than grade 8 to the completion of graduate and professional degrees. With one exception, all respondents offered valid responses to this survey item, minimizing the challenges associated with missing data. The educational attainment categories have been collapsed; individuals who have not completed an undergraduate degree are coded as zero, while those who have obtained a bachelor's degree and above are coded as one.

Depression.

The depression measure is based on a 12-item revision of the CES-D scale with values that range from 0 to 36 (Poulin et al., 2005). Several items that are required for the original 20-item version are either missing from the public-use version of Add Health or are worded differently, which warrants the use of an alternative scale (McLeod et al., 2012; Radloff, 1977). The 12-item revision has been demonstrated to be a valid and reliable predictor; however, compared to the 20-item version, it does not inquire extensively on irritability, which may point to a potential limitation because this is a key symptom of depression among children and adolescents (Poulin et al., 2005). The 12 items include physical and psychological symptoms associated with depression, such as "[y]ou didn't feel like eating, your appetite was poor" and "[y]ou felt that you could not shake off the blues, even with help from your family and your friends." There are four response categories for each item on the scale that indicate the frequency

at which depressive symptoms were experienced within one week of the interview. The response options are as such: "never or rarely, sometimes, a lot of the time, and most of the time or all of the time." These categories are coded from zero to three; ascending values coincide with more frequent symptoms.

The 12-item depression scale has been recoded as an ordinal variable to indicate meaningful cut points; scores ranging from 0-11 reflect minimal depressive symptoms, scores ranging from 12-20 denote somewhat elevated symptoms, and scores ranging from 21-36 signify very elevated symptoms (Poulin et al., 2005). Minimal depressive symptoms are coded as zero, somewhat elevated symptoms are coded as one, and very elevated symptoms are coded as two. According to this measure, approximately 20% of the analytic sample had somewhat or very elevated symptoms, which is consistent with past epidemiological research (Lewinsohn, Rohde & Seeley, 1998; McLeod et al., 2012; Poulin et al., 2005). Since the data are organized in wide format, separate depression variables are constructed for waves one and two.

Duration and Timing of Depressive Symptoms.

In order to capture different patterns of depressive symptoms in adolescence, dichotomous depression variables that indicate very elevated symptoms, or scores ranging from 21-36, are constructed for waves one and two. Based on these dichotomous variables, four more binary variables that capture the following patterns across both waves are constructed: never depressed, only depressed during the first wave, only depressed during the second wave, and depressed both waves. Using these four distinct variables, a single variable, entitled depression pathways, is constructed to capture this information more efficiently; those who are not depressed across waves one and two are the omitted category in multivariate models. It should be noted that these variables may not precisely capture early or late onset of depression because

there is an age range of approximately eight years, or six grade levels, among sample participants at wave one. That is to say, it is difficult to ascertain the precise timing of depression because these variables do not simultaneously account for the participants' ages. Notwithstanding these potential challenges, these variables serve as reasonable proxies for timing, allowing me to investigate if different patterns of depression in adolescence are related to academic achievement in young adulthood. Moreover, duration can still be adequately assessed with the available measures, since those who are depressed both waves can be compared with those who are only depressed at waves one or two.

Control Variables.

Participant Characteristics.

The following participant characteristics are held constant: age, sex, race, self-rated health, and academic aptitude. McLeod et al. (2012) posit that educational attainment is potentially higher among older participants in Add Health at wave four, which necessitates the inclusion of age as a control variable. As mentioned above, sex is an especially relevant control because the psychological well-being of girls tends to be more strongly related to their family origins (Read & Gorman, 2010). However, some evidence also suggests that internalizing problems are more strongly associated with subsequent attainment for boys (McLeod & Kaiser, 2004; Rosenfield, 1982). Jackson (2009) identifies important racial disparities, noting that depression is most strongly related to poor achievement for non-Hispanic whites, and so a single race variable has been constructed using wave one data. Moreover, psychological and physical well-being are greatly intertwined in adolescence, and self-rated health has therefore been included (Read & Gorman, 2010; Rugulies, 2002). Based on the recommendations of McLeod et

al. (2012), academic aptitude is assessed with standardized vocabulary test scores that were collected at wave one.

Parental and Family Background Characteristics.

Depression and poor academic performance are more common among adolescents from lower socioeconomic backgrounds; adolescents who have single, poorly educated, or sickly parents are at an especially high risk (Bradley & Corwyn, 2002; Johnson et al., 2015; Pallas, 2003; Pearlin et al., 2005). To control for these potential confounders, the following variables in the parental instrument are controlled: parental age, parental education, household income, marital status, parental self-rated health, and parental happiness. The variables from the parental instrument have far more missing values when compared to the focal variables; for instance, over 20% of the cases for household income are missing. To address this issue, the parental controls are recoded as nominal variables, and missing values are coded as separate response categories.

Analytic Strategy

Because the outcome variable is dichotomous, logistic regression is used to estimate the likelihood of completing postsecondary education across several nested models. To test the first and second hypotheses, I begin with a zero-order model to assess the relationship between depression in adolescence and subsequent educational attainment in young adulthood. The ordinal depression variable allows me to compare those who experience highly elevated symptoms with those who experience only somewhat elevated symptoms. It should be noted that the depression variable in the first model utilizes data from wave one. Next, to test the third and fourth hypotheses, I include the depression pathways variable to capture the timing and duration of depressive symptoms to discern if they are related to postsecondary completion. The main

depression variable is omitted from these subsequent models to avoid multicollinearity. Afterwards, I rerun the model with the depression pathways variable twice to undercover greater nuance and to test the fifth hypothesis. In the first rerun, I only include participant characteristics. In the second rerun, I keep participant attributes in the regression, but I also include parental and family background characteristics. Altogether, four separate logistic regression models are run.

Aside from the parental variables, there are surprisingly few missing values. For all focal and control variables, less than 0.5% of cases are missing, with vocabulary tests scores as the only exception; 3.75% of cases are missing for this particular variable. Because of the relatively few missing values, complex procedures, including multiple imputation, are not needed to preserve cases for the analysis. Therefore, listwise deletion of missing cases is most appropriate. The size of the analytic sample is minimally affected and is only reduced to 3,750 participants from the original 3,924. To put it another way, the sample size is reduced by a mere 4.4%.

Results

Descriptive Statistics

Columns 1 and 2 of Table 1 present bivariate results from cross-tabular analysis of postsecondary completion. Interestingly, in terms of depression, there appears to be a stark gradient. 33% of adolescents who reported minimally elevated symptoms at wave one completed an undergraduate degree or above at wave four. In contrast, 22% of those who reported somewhat elevated symptoms at wave one completed postsecondary schooling at wave four. Among those who reported very elevated symptoms, this figure is reduced to a mere 12%. These patterns strongly suggest that youth who experience depression are less likely to complete postsecondary schooling and that the severity of their symptoms matters.

Tables.

Table 1: Characteristics of the Analytic Sample (*N* = 3,750)

Educational Attainment	Less than Postsecondary	Completed Postsecondary
Depression Categories (%)		
Minimal Symptoms	67.0	33.0
Somewhat Elevated Symptoms	78.4	21.6
Very Elevated Symptoms	87.7	12.3
Depression Pathways (%)		
Never Depressed	68.9	31.1
Depressed First Wave Only	87.5	12.5
Depressed Second Wave Only	82.9	17.1
Depressed Both Waves	88.2	11.8
Age (mean)	15.0	14.9
	(1.7)	(1.5)
Sex (%)		
Male	73.2	26.8
Female	66.3	33.6
Race (%)		
Caucasian	65.7	34.3
Hispanic	81.4	18.6
African American	79.1	21.9
Native American	85.7	14.3
Asian	52.0	48.0
Other	69.6	30.4
Self-Rated Health (%)		
Excellent Health	60.3	39.7
Very Good Health	66.8	33.2
Good Health	78.4	21.6
Fair or Poor Health	90.3	9.7
Vocabulary Test Scores (mean)	98.3	109.0
	(13.8)	(12.8)
Parental Age (%)		
Older Parents - Ages 40 to 80	61.1	38.1
Younger Parents - Ages 20 to 39	80.2	19.8
Missing	74.8	25.2
Parental Education (%)		
Less than Undergraduate	79.1	20.9
Completed Undergraduate	43.8	56.2
Beyond Undergraduate	26.2	73.8
Missing	74.7	25.3

(*Continued*)

Household Income (%)		
$0 - $40,000	80.5	19.5
$50,000 - $99,000	53.3	46.7
$100,000 & Over	32.5	67.5
Missing	72.7	27.3
Parental Marital Status (%)		
Married	64.3	35.7
Single & Never Married	85.3	14.7
Widowed	79.5	20.5
Divorced	80.0	20.0
Separated	88.2	11.8
Missing	74.6	25.4
Parental Self-Rated Health (%)		
Excellent Health	55.6	44.4
Very Good Health	67.9	32.1
Good Health	73.3	26.7
Fair or Poor Health	85.6	14.4
Missing	74.7	25.3
Parental Happiness (%)		
Happy	68.8	31.2
Unhappy	80.8	19.2
Missing	74.0	26.0

Note: Figures are weighted means with standard deviations in parentheses or weighted row percentages. Adjustments have also been made with the appropriate cluster variable to account for the sampling design of Add Health. With the exception of the outcome variable and measure of mental health pathways, which utilize data from waves four and two, all data come from the wave one instrument.

Table 2: Logistic Regression Results for Nested Models Predicting Postsecondary Completion

	Model 1		Model 2		Model 3		Model 4	
	B	(SE B)	*B*	(SE B)	B	(SE B)	*B*	(SE B)
Depression Categories								
Minimal (omitted)								
Somewhat Elev.	-0.63***	(0.11)						
Very Elev.	-1.30***	(0.32)						
Depression Pathways								
Never Dep. (omitted)								
First Wave Only			-1.14**	(0.37)	-0.85*	(0.39)	-1.05*	(0.43)
Second Wave Only			-0.74*	(0.34)	-0.57	(0.34)	-0.57	(0.36)
Both Waves			-1.44*	(0.59)	-1.22*	(0.58)	-1.20*	(0.58)
Age					-0.001	(0.03)	-0.02	(0.03)
Sex								
Male (omitted)								
Female					0.61***	(0.11)	0.67***	(0.11)
Race (%)								
Caucasian (omitted)								
Hispanic					-0.33†	(0.20)	-0.11	(0.19)
African American					-0.01	(0.19)	0.19	(0.18)
Native American					-0.93**	(0.36)	-0.73†	(0.42)
Asian					1.25***	(0.32)	1.09***	(0.31)
Other					-0.16	(0.60)	-0.35	(0.66)
Self-Rated Health								
Excellent (omitted)								
Very Good					-0.38***	(0.11)	-0.28**	(0.11)
Good					-0.91***	(0.12)	-0.78***	(0.13)
Fair or Poor					-1.64***	(0.26)	-1.43***	(0.25)
Vocabulary Test Scores					0.06***	(0.005)	0.05***	(0.005)
Parental Age								
Ages 40 to 80 (omitted)								
Ages 20 to 39							-0.51***	(0.11)
Missing							-0.67	(0.69)

(*Continued*)

Parental Education								
Less than BA (omitted)								
Completed BA							1.03***	(0.14)
Beyond BA							1.57***	(0.20)
Missing							0.07	(0.44)
Household Income								
$0 - $40,000 (omitted)								
$50,000 - $99,000							0.63***	(0.13)
$100,000 & Over							1.01***	(0.25)
Missing							0.44**	(0.17)
Parental Marital Status								
Married (omitted)								
Single							-0.18	(0.22)
Widowed							-0.49†	(0.29)
Divorced							-0.41**	(0.15)
Separated							-0.86***	(0.27)
Missing							-0.63	(0.73)
Parental Self-Rated Health								
Excellent (omitted)								
Very Good							-0.18	(0.14)
Good							-0.11	(0.13)
Fair or Poor							-0.54**	(0.20)
Missing							-0.08	(0.55)
Parental Happiness								
Happy (omitted)								
Unhappy							0.23	(0.28)
Missing							0.96†	(0.57)
Constant	-0.71***	(0.09)	-0.81***	(0.09)	-7.24***	(0.80)	-5.90***	(0.79)
Observations	3,750		3,750		3,750		3,750	

Note: All four models predict postsecondary completion and are run with the appropriate weight and cluster variables. The table presents logged odds with their standard errors in parentheses. Reference categories have the term "omitted" in parentheses. † $p \leq 0.1$, *$p \leq 0.05$, **$p \leq 0.01$, and ***$p \leq 0.001$.

Although significant differences cannot be ascertained via Table 1, as no supplementary tests were conducted, the disparities appear to be substantial and are consistent with hypotheses one and two.

With respect to the various pathways of depression, interesting patterns are observed. As expected, those who did not report very elevated symptoms across waves one and two are the most highly educated on average, with 31% completing postsecondary schooling at wave four. A greater proportion of adolescents who reported very elevated symptoms at wave two completed postsecondary schooling relative to those who were only depressed at wave one; the percentages are 17% and 13%, respectively. These distributions are consistent with McLeod and Fettes' (2007) analysis because early onset appears to be more detrimental to academic success than late onset. Lastly, compared to other groups, adolescents who were depressed both waves are the most poorly educated, as only 12% completed postsecondary schooling. However, the difference in terms of postsecondary completion between those depressed at wave one and both waves is only 1%. Multivariate testing is needed to determine if these patterns are statistically significant, net of participant and parental characteristics.

Nested Models

Table two presents logistic regression results for nested models predicting postsecondary completion. In this analysis, variables of interest are added to the regression in four logical stages. Model 1 is a bivariate regression that predicts postsecondary completion as a function of wave one depression. Model 2 serves as the baseline for subsequent tests; the depression pathways variable is used as the main predictor in lieu of the ordinal depression variable to avoid multicollinearity. Model 3 includes participant attributes as controls to uncover greater nuance and to see if the relationships observed in Model 2 hold under greater scrutiny. Lastly, Model 4

also includes parental characteristics. The results of these nested models are briefly exposited below, and additional commentary on their relevance will be offered in the discussion section to follow.

First, in order to assess hypotheses one and two, I test whether adolescents in poor mental health are less likely to complete postsecondary schooling relative to the reference group (those reporting minimal depression) and whether there is a significant difference between those who report somewhat and highly elevated symptoms. Similar to the bivariate descriptive statistics, Model 1 suggests that adolescents who report somewhat elevated symptoms at wave one are 47% less likely to complete postsecondary schooling when compared to those who are not depressed ($(e^{-0.63}-1) \times 100$). Moreover, those who experience highly elevated symptoms are 73% less likely to complete postsecondary schooling relative to the reference category ($(e^{-1.30}-1) \times 100$). Both coefficients are highly significant ($p < 0.001$). According to the adjusted Wald test, there is a statistically significant difference between those who report somewhat and highly elevated symptoms at wave one ($p < 0.05$). Altogether, these results lend credence to hypotheses one and two.

Second, I assess whether different pathways of depression are associated with postsecondary completion. Model 2 suggests that adolescents who experience highly elevated symptoms at wave one only, wave two only, and both waves are significantly less likely to complete postsecondary education relative to those who never experience severe depression. Interestingly, the coefficient that corresponds with those depressed at wave one is significant at the 0.01 level, whereas the remaining coefficients of the depression pathways variable are significant at the 0.05 level. Consistent with the bivariate descriptive statistics, the strength of the association relative to the reference category is greatest among those who are depressed both

waves, followed by those depressed at wave one, and lastly by those depressed at wave two. Before I make any definitive conclusions about either duration or timing, I test to see if these results remain significant when I add the control variables into the regression.

Next, I add participant characteristics to the baseline model, including age, sex, race, self-rated health, and standardized vocabulary test scores (all measured at wave one). Interestingly, net of these characteristics, the coefficient that denotes elevated depressive symptoms at wave two drops out of significance in Model 3. The magnitude of the coefficients that signify elevated symptoms at wave one and both waves are substantially attenuated, though they remain statistically significant ($p < 0.05$). Please note that this is an approximation, as there is a body of literature indicating the inability to directly compare coefficients across logistic regression models (Breen, Karlson & Holm, 2013; Kohler, Karlson & Holm, 2011; Mood, 2010). Although the coefficient for those depressed both waves is larger than the coefficient for those depressed at wave one, the adjusted Wald test reveals that there is in fact no significant difference between these categories, net of participant characteristics.

Finally, I include both sets of controls, namely participant and parental attributes, in Model 4. The results in Model 4 largely mirror the patterns observed in Model 3. The coefficient that denotes elevated depressive symptoms at wave two remains insignificant. Likewise, the remaining two coefficients of the depression pathways variable are statistically significant ($p < 0.05$). However, there is one notable difference. Looking across Models 3 and 4, there is evidence for suppression. In Model 3, adolescents who report highly elevated symptoms at wave one are 57% less likely to complete postsecondary schooling at wave four, net of participant characteristics ($(e^{-0.85}-1) \times 100$). In Model 4, these same individuals are 65% less likely to complete postsecondary education, net of participant and parental attributes ($(e^{-1.05}-1) \times 100$). It

is difficult to explain why parental characteristics suppress the relationship between early onset of depressive symptoms and later educational attainment because there is no precedent in the existing literature.

The results of the present analysis offer minimal support for hypothesis three. The strength of the association for those depressed both waves is greatest relative to the reference category across Models 2, 3, and 4. However, the adjusted Wald test confirms that there is no significant difference between those depressed both waves and those depressed at wave one, net of participant and parental characteristics. In contrast, substantial support is provided for hypotheses four and five. The timing of depression does in fact matter; early onset, as measured by wave one depression, predicts worse educational attainment relative to those who are not depressed when controlling for participant and parental characteristics. These findings support the theory of developmental continuity as anticipated, illustrating the importance of mental health early in the life course. Conversely, late onset, as measured by wave two depression, falls out of significance when participant characteristics are held constant, which discredits the theory of developmental discontinuity.

Discussion

This analysis used panel data from the National Longitudinal Study of Adolescent to Adult Health to examine the relationship between patterns of depression in adolescence and educational attainment. The results of my research can be briefly summarized with five key points. First, adolescents who experience depression are less likely to complete postsecondary schooling relative to those who are not depressed. Second, the likelihood of postsecondary completion decreases to an even greater extent among individuals with highly elevated symptoms. Third, adolescents who experience depression for longer periods of time tend to have

poor educational outcomes, though they do not differ significantly from those who only experience depression at wave one. Fourth, early onset of depressive symptoms is strongly related to lower levels of educational attainment, while late onset appears to have no discernable consequences, net of individual and parental attributes. Finally, even when a host of participant and parental characteristics are held constant, depression remains a strong predictor of academic achievement.

These findings add to the existing literature in a number of ways. Previous research has demonstrated that early onset of internalizing issues is a powerful predictor of college entry (McLeod & Fettes, 2007). The present analysis has utilized a recent data set to investigate if similar patterns can be observed among more recent cohorts. Ultimately, the academic achievement of American youth is not fully explained by their sociodemographic attributes, intellectual endowments, and family origins; as demonstrated above, psychological well-being also appears to play an important role. Moreover, the life course concept of timing has proven to be especially useful because the link between depression and later attainment matters most if symptoms are experienced in early adolescence. Interestingly, these results and McLeod and Fettes' (2007) analysis both support developmental continuity using two different data sets and outcome variables. When college entry or completion is the outcome of interest, developmental discontinuity appears to lack verisimilitude. However, more than two studies are needed before definitive theoretical conclusions can be drawn. In addition, it is possible that developmental discontinuity is better suited to explain other health-related or socioeconomic outcomes at different life stages. On the whole, even though many researchers have argued that selection processes are beyond the purview of sociology, often suggesting that they are methodological

nuisances, it is clear that this point of view is misguided and that it has led to major gaps in our knowledge (Johnson et al., 2015; McLeod & Pavalko, 2008).

This research has several important policy implications. The psychological literature has routinely demonstrated that school-related social support (e.g., teacher support, student support, and the availability of counselling and other resources) is significantly related to adolescents' subjective well-being and to depression (Buchanan, 2008; Pössel et al., 2018; Rueger, Malecki, Pyun, Aycock & Coyle, 2016; Tian, 2016). Therefore, it seems apropos that we continue to advocate for the availability of resources that are supportive of mental health at elementary and secondary schools. Future research should also determine how the link between early onset and academic success could inform these advocacy efforts, since different intervention strategies are needed to obviate or manage mental health problems that emerge in early or late adolescence. Ultimately, these issues need to be subjected to far greater scrutiny than they have been in the existing literature. After all, a well-educated workforce plays a crucial role in economic strength and global competitiveness, and so we should aim to maximize the academic potential of our youth (Ramoniene & Lanskoronskis, 2007; U.S. Department of Education, 2017).

Although this study has made important contributions, there are several limitations that need to be addressed in subsequent research. First, only two waves of data are used to capture different pathways of depression in adolescence. As mentioned above, the third wave of Add Health focuses on the transition from adolescence to adulthood and lacks many of the items required to construct the CES-D scale. More powerful and informative tests could have been conducted if more waves of data were available. Second, there is only a one-year gap between waves one and two, which may weaken the evidence with respect to early onset. I argue that the depression pathways variable in this analysis still provides a substantial advantage over static

measures and that a single year has important implications during the adolescent life stage; nonetheless, it may have been desirable to have greater spacing between waves one and two. Third, as mentioned above, the 12-item revision of the CES-D scale does not inquire extensively on irritability, and so an important aspect of depression in youth may have been overlooked. Fourth, even if the original 20-item CES-D scale were available for the present analysis, a direct measure of clinical depression could yield more explanatory power. However, variables that capture diagnosed psychological conditions, such as clinical depression, are only available in waves three and four of Add Health. Fifth, it may have been more informative to use multinomial logistic regression to investigate how depression is related to the likelihood of completing bachelor degrees, graduate degrees, and professional programs, such as medicine and law. Unfortunately, there are too few individuals in the public-use version of Add Health who attained advanced degrees, and so this approach is unfeasible. Lastly, my ability to generalize the results to Hispanics, African Americans, Native Americans, and Asians may be limited, given the discrepancies that are observed between the respondents who are matched and unmatched across waves one, two, and four.

Despite these clear limitations, this article still advances the mental health and education literature, demonstrating that the adolescent life stage is essential to understanding outcomes in young adulthood as well as the intergenerational transmission of inequality. Future research needs to replicate and expand on these findings to make potential policy recommendations more appealing to legislators. The U.S. Department of Education (2017) has articulated a goal to "promote student achievement and preparation for global competitiveness by fostering educational excellence and ensuring equal access." However, to truly abide by this goal, we should ensure that resources are in place to support the psychological and emotional well-being

of elementary and high school students in order to facilitate optimal learning and to maximize achievement.

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